This listing of claims will replace all prior versions and listings of claims in this application:

a.) Listing of Claims

1. (original) A WDM layer-based OchP (Optical Channel Protection) device capable of signal transmission on working channels and routing selection for protection channels between the transferred traffic and the WDM system, comprising

a transmitting module and

a receiving module;

the transmitting module and the receiving module each comprising

N working channels connected to receiving ends and to transmitting ends of N working channels of the WDM system respectively,

M protection channels connected to receiving ends and to transmitting ends of M protection channels in the WDM system respectively; and

a switching device designed to switch signals in the working channels to the protection channels and to switch signals in the protection channels to the working channels according to switching requests from the WDM system;

wherein M and N are natural numbers and M<N.

2. (original) The WDM layer-based OChP device according to Claim 1, wherein M is greater than 1.

3. (original) The WDM layer-based OChP device according to Claim 1, wherein the switching device of the transmitting module comprises

N 50:50 couplers and

an N×M optical switch; one of the two output ports of each coupler being connected to a working channel in the WDM system, the other of the two output ports being connected to an input port of the N×M optical switch; M output ports of the N×M optical switch being connected to the M protection channels of the WDM system respectively;

and wherein the switching device of the receiving module comprises

N 50:50 couplers and

an M×N optical switch, one of the two input ports of each coupler being connected to a working channel in the WDM system, and the other of the two input ports being connected to an output port of the M×N optical switch; M input ports of the M×N optical switch being connected to the M protection channels of the WDM system respectively.

4. (original) The WDM layer-based OChP device according to Claim 1, wherein the switching device of the transmitting module comprises

N 1×2 optical switches and

an N×M optical switch, one of the two output ports of each 1×2 optical switch being connected to a working channel in the WDM system, the other of the two output ports being connected to an input port of the N×M optical switch; M output ports of the N×M optical switch being connected to the M protection channels of the WDM system respectively;

and wherein the switching device of the receiving module comprises

N 1×2 optical switches and

an M×N optical switch, one of the two input ports of each 1×2 optical switch being connected to a working channel in the WDM system, the other of the two input ports being connected to an output port of the M×N optical switch, and M input ports of the M×N optical switch being connected to the M protection channels of the WDM system respectively.

5. (original) The WDM layer-based OChP device according to Claim 1, wherein said switching device of said transmitting module comprises

an N×(N+M) optical switch, the N+M output ports of the N×(N+M) optical switch being connected to the N working channels and the M protection channels of the WDM system respectively;

and wherein the switching device of the receiving module comprises

an (N+M)×N optical switch, the N+M input ports of the (N+M)×N optical switch being connected to the N working channels and the M protection channels of the WDM system respectively.

6. (original) A WDM layer-based OChP method capable of signal transmission through working channels and routing selection for protection channels between the transferred traffic and the WDM system comprising the following steps:

monitoring by the WDM system of quality of signals in each channel and routing state of OchP modules in the system in real time;

determining by the WDM system whether some signals in the working channels are to be switched to the protection channels; and if they are, selecting the protection channels the WDM system ;

sending by the WDM system of accurate switching requests to the OchP transmitting module and the OchP receiving module;

performing by the OchP transmitting module and the OchP receiving module of switching according to the switching requests from the WDM system;

wherein the WDM system comprises N working channels and M protection channels, M and N being natural numbers, M being less than N.

7. (original) The WDM layer-based OchP method according to Claim 6, wherein M is greater than 1.

8. (original) The WDM layer-based OchP method according to Claim 6, further comprising

determining by the WDM system whether come signals transmitted in the protection channels are to be switched back to the working channels, and if they are, determining the working channel to receive the signals, and sending accurate switching requests to the OchP transmitting module and the OchP receiving module simultaneously.

9. (original) The WDM layer-based OChP method according to Claim 6, wherein when no signals are switched to the protection channels, the protection channels carry traffic with low priority.

10. (new) A WDM layer-based optical channel protection device for a multi-channel WDM system comprising

a transmitter comprising

N transmitter inputs;

N working outputs, each working output being connected to the receiving end of a working channel of the WDM system;

M protection outputs, each protection output being connected to the receiving end of a protection channel of the WDM system; and

a transmitter switching unit capable of directing signals from the N signal inputs to the N working outputs and to the M protection outputs;

and a receiver comprising

N receiver outputs;

N working inputs, each working input being connected to the transmitting end of a working channel of the WDM system;

M protection inputs, each protection input being connected to the transmitting end of a protection channel of the WDM system; and

a receiver switching unit capable of directing signals to the N signal outputs from the N working inputs and from the M protection inputs;

wherein M is less than N.

11. (new) The device of Claim 10, wherein M is greater than 1.

12. (new) The device of Claim 10,

wherein the transmitter switching unit comprises

an N×M transmitter optical switch comprising N input ports and M output ports, each output port being coupled to the receiving end of a protection channel of the WDM system and

N transmitter couplers, each transmitter coupler comprising

an input port coupled to a corresponding transmitter input,

a first output port coupled to the receiving end of a working channel of the WDM system, and

a second output port coupled to an input port of the N×M transmitter optical switch;

and wherein the receiver switching unit comprises

an M×N receiver optical switch comprising M input ports and N output ports, each input port being coupled to the transmitting end of a protection channel of the WDM system and

N receiver couplers, each receiver coupler comprising

an output port coupled to a corresponding receiver output,

a first input port coupled to the transmitting end of a working channel of the WDM system, and

a second input port coupled to an output port of the M×N receiver optical switch.

13. (new) The device of Claim 10,

wherein the transmitter switching unit comprises

an N×M transmitter optical switch comprising N input ports and M output ports, each output port being coupled to the receiving end of a protection channel of the WDM system and

N transmitter 1×2 optical switches, each transmitter 1×2 optical switch comprising

an input port coupled to a corresponding transmitter input,

a first output port coupled to the receiving end of a working channel of the WDM system, and

a second output port coupled to an input port of the N×M transmitter optical switch;

and wherein the receiver switching unit comprises

an M×N receiver optical switch comprising M input ports and N output ports, each input port being coupled to the transmitting end of a protection channel of the WDM system and

N receiver 1×2 optical switches, each receiver 1×2 optical switch comprising

an output port coupled to a corresponding receiver output,

a first input port coupled to the transmitting end of a working channel of the WDM system, and

a second input port coupled to an output port of the M×N receiver optical switch.

14. (new) The device of Claim 10,

wherein the transmitter switching unit comprises

an N×(N+M) transmitter optical switch comprising

N input ports, each input port being coupled to a corresponding transmitter input,

N output ports, each of the N output ports being coupled to the receiving end of a working channel of the WDM system, and

M output ports, each of the M output ports being coupled to the receiving end of a protection channel of the WDM system

and wherein the receiver switching unit comprises

an (N+M)×N receiver optical switch comprising

N output ports, each output port being coupled to a corresponding receiver output,

N input ports, each of the N input ports being coupled to the transmitting end of a working channel of the WDM system, and

M input ports, each of the M input ports being coupled to the transmitting end of a protection channel of the WDM system.

15. (new) A WDM layer-based optical channel protection method for a multi-channel WDM system comprising

monitoring quality of signals carried by the channels,

determining based on the quality of a signal in a working channel whether to route the signal via a protection channel,

sending a first switching request to a transmitter switching unit to route the signal via a protection channel, and

sending a second switching request to a receiver switching unit to route the signal via a protection channel,

wherein the multi-channel WDM system comprises N working channels and M protection channels, M being less than N.

16. (new) The method of Claim 15, wherein M is greater than 1.

17. (new) The method of Claim 15, further comprising

determining whether to route a signal on a protection channel via the signal's working channel;

sending a first switching request to a transmitter switching unit to route the signal via the signal's working channel, and

sending a second switching request to a receiver switching unit to route the signal via the signal's working channel.

18. (new) The method of Claim 15, further comprising routing low-priority traffic via the protection channels when the protection channels do not carry signals.